

Lakes, Ponds and Reservoirs

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Shallow Lake Renovation Based on Alternative Stable Trophic States

Shallow natural lakes in Iowa are notorious for poor water quality. Shallow lakes are known as “tweener” since they are too shallow to be consistently good lakes, and too deep to be consistently good marshes. Alternative stable trophic states means that shallow lakes in Iowa can exist in one of two conditions; the turbid water state or the clear water state. When these lakes are in the turbid water state they are characterized by very turbid water, little to no aquatic vegetation, limited emergent vegetation, a sparse fishery dominated by carp and bullheads, and limited waterfowl production. However, many of these same lakes can also be in a clear water state which is typified by clear water, abundant aquatic vegetation, shallow bays covered with emergent vegetation, a desirable fishery dominated by sport fish species, and enhanced waterfowl production.

Shallow lakes can remain stable for years in either the clear, or turbid water state. It usually takes a major perturbation or management action to move from one state to another. For instance, a drought can dry up the shoreline of a shallow lake exposing mud flats that dry out and compact. Aquatic plant seeds, lying dormant for decades, finally germinate in these conditions and are flooded when the lake refills. Once established, these plants help consolidate the lake bottom with their root and absorb wind and wave action keeping the bottom from being churned up. These plants also provide habitat for aquatic insects and zooplankton and help keep the water clear by allowing underwater plants to grow. This clear water state will usually last as long as the plants persist. This cycle is natural, but our current drainage and management patterns have favored consistently higher water levels. These water levels and super abundant common carp populations slowly erode the plant life in the lake until the lake reaches a tipping point and returns to the turbid water state. The goal of this project is to develop tools that managers can use to shift and maintain shallow lakes in a clear water state.

Diamond Lake in Dickinson County is one of these “tweener” lakes and is a good candidate for restoration. The lake and watershed are owned by the Iowa Department of Natural Resources. Some of the recent improvements include: lake drawdown to encourage aquatic plant growth, removal of rough fish species through winter kill and rotenone application, installation of a fish barrier, and lowering the lake outlet for improved emergent vegetation growth. In 2009 dense stands of emergent and submergent vegetation were established in the lakebed as a result of the drawdown. Twenty four species of aquatic plants were inventoried in 2009 (four species present pre-project). Dense stands of aquatic vegetation were observed in 2010 as well and water clarity has more than doubled since the drawdown. Diamond Lake was re-stocked with yellow perch in 2009 and 2010 and northern pike in 2010. Growth rates of yellow perch and northern pike have been phenomenal since reintroduction. Waterfowl use counts at Diamond Lake increased nearly 30 fold from 2006 to 2009. Due to the project success, Diamond Lake received national recognition by the National Fish Habitat Action Plan as one of ten “Waters to Watch” for 2010.